

var. *roji*, Watt. It can safely be said that the last varietal name is superfluous, being synonymous with *G. obtusifolium*, Roxb., as interpreted in this book.

As examples of cases in which a plant is wrongly assigned to an old-established species, the following cases may be cited:—

(1) *G. peruvianum*, Cav., is stated (p. 217) to have fuzz-coated seeds, though Cavanilles states that the seeds are black, *i.e.* devoid of fuzz, and figures them so. This discrepancy would have been immaterial had not the presence or absence of fuzz on the seed been made the basis of classification (see later). This plant is stated to produce the Imbabura cotton of Peru, while the Piura cotton is stated to be produced by a somewhat similar but hairy plant, which is identified as *G. vitifolium*, Lamk. It suffices to say first that Piura cotton is produced by the plant Cavanilles called *peruvianum*, which has, as that author states, naked seeds; and secondly, that Lamarck states that his species *vitifolium* has the under sides of its leaves glabrous.

(2) Of *G. microcarpum*, Tod., its author mentions specially that the two lobes on either side of the central one were unequal, and gives a good figure of this. Our present author not only gives (plate 36) a plant with much broader lobes, but one which does not display the peculiarity of lobes mentioned, is called "red Peruvian cotton," and differs from ordinary Peruvian only in bearing brown cotton instead of white. The reviewer has grown the real *G. microcarpum*, which is an exceedingly characteristic variety, and can be distinguished with certainty at a glance. It is, indeed, the plant for which our author has created a new species, *viz.*, *G. Schottii*, two specimens cited as types in the British Museum being exactly the plant as figured and described by Todaro, and as grown by the present writer. Examples of this kind might be multiplied almost indefinitely.

Turning to the system on which the varieties are classified in the volume under review, we find it is as follows:—

Section i., Species with fuzz but no floss.

Section ii., Fuzzy seeded cottons with united bracteoles.

Section iii., Fuzzy seeded cottons with free bracteoles.

Section iv., Naked seeded cottons with bracteoles free, or nearly so, and glands conspicuous.

Section v., Naked seeded cottons with bracteoles quite free and floral glands absent.

It will be noted that the presence or otherwise of a fuzzy covering to the seed below the cotton is made the primary basis of classification. Now it is hardly too much to say that every cultivated species of cotton comprises varieties some of which bear a fuzzy and others do not. The present writer has found among others completely naked seeded varieties in the species (to adopt the nomenclature of our author) *G. nanking* (Chinese and Japanese cottons), *G. nanking*, var. *roji*, *G. obtusifolium*, var. *Wightiana*, *G. herbaceum*, *G. punctatum*, *G. hirsutum*. The naked-seeded varieties show not the slightest trace of hybridisation with a member of sections iv. or v.,

and, indeed, a hybrid between any of the first four varieties named and a member of sections iv. and v. is by no means readily produced even by artificial means. Yet our author seeks to explain the occurrence of naked seeds in the "*jowari hathi*" (=country cotton) of Madras by the supposition of a naturally produced cross between *G. obtusifolium*, var. *Wightiana* (section ii.), and Bourbon cotton (*G. purpurascens*, section iv.). Similarly, those of American upland varieties that have naked seeds are said to be crosses with a naked-seeded variety for this reason alone.

If any further proof of the fallacy of this method is required, it is found in the fact that fuzzy-seeded American has in India been converted into a naked-seeded variety in a few generations by the present writer through the simple process of growing it under irrigation in well-manured soil. That such a change occurs is well known to cultivators in the West Indies and other parts of the world.

If we take the second point on which the classification is based, *viz.* whether the bracteoles are free or united, we find the same impossibility of applying the characteristic in the field, in some varieties there being found, *on the same plant*, flowers with the bracteoles all free, others with them all united, and still others with two united and one free.

The last chapter (thirty-one pages) is devoted to a discussion of "The Improvement of the Cotton Plant." This consists merely of a general description of the process of selection equally applicable to all crops, an attempt to trace the history of some varieties now grown, and a description of the pollen grains of some species of cotton.

Throughout the book no attempt is made to give the character of the cotton produced under given conditions of soil and climate by the several varieties described, though the author hopes in his preface that the book will be useful to "planters and seed producers throughout the world."

F. FLETCHER.

A CONCISE WORK ON EVOLUTION.

Evolution and Animal Life. An Elementary Discussion of Facts, Processes, Laws and Theories relating to the Life and Evolution of Animals. By David Starr Jordan and Vernon Lyman Kellogg. Pp. xi+489; illustrated. (New York: D. Appleton and Company, 1907.) Price 2.50 dollars net.

THERE is growing up a generation of biological students that does not read its Darwin, its Weismann, or Galton; instead, it cons manuals and text-books on the works of these masters. It is so very much less trouble, if the student's object is to satisfy an examiner, to "get up" a text-book on evolutionary problems than to extract from original sources a clear conception of the authors' theories; and yet what a world of difference is there between the *ipsissima verba* of a master and the cut-and-dried phrases of the manual-maker! The one is the advocate pleading his cause with all the eloquence in his power, the other the reporter compressing the living words and phrases into the limits of a column. The

one is inspiring, stimulating, the other can scarcely avoid exceeding dullness, and certainly no one ever yet was roused to enthusiasm by a text-book.

The book before us is no worse than most of its kind; indeed, it is a great deal better than many. It is compiled from lectures delivered at the Leland Stanford Junior University, and traces of the originality which must have characterised the lectures of two zoologists of the standing of our authors may be found in the book. Refreshing oases of excerpts from original sources frequently add variety to arid plains of didactic statement, and occasionally one may stumble on a good story; such as that of the frozen fish which, bolted whole by a ravenous dog, later emerged alive and flapping from its prison; or the comment of Yves Delage on Schaffhausen's statement that life must have originated from simple inorganic substances, and taken the form of an uncoloured protococcus which later became *Protococcus viridis*. "If the thing is so simple, why does not the author produce one of these protococci in his laboratory? *On lui ferait grace de la chlorophylle.*"

There is a wealth of process-block illustrations of varying degrees of excellence; some are new, some emerge from the obscurity of scientific journals, and some old friends do duty once again. Frequently there is no reference in the text to the figures, and the intelligent student will ask himself for what purpose they are there. As an example may be taken a very poor figure on p. 306, in the chapter on palæontology; it is entitled "Flying Dragon (Draco)." What is this meant to teach our intelligent student? For all that he may find out from the text it may be a mythical monster, the restoration of some giant fossil form, or the little flying lizard of the Oriental tropics.

The ground covered in this work is immense, as the titles of some of the chapters indicate:—Variation and Mutation, Generation, Sex and Ontogeny, Geographical Distribution, Parasitism and Degeneration, Reflexes, Instinct and Reason. The bearing of palæontology on problems of evolution is discussed in eighteen pages; man's place in nature in seventeen. It is impossible to criticise such pemmican at any length; if it is inaccurate it is worthless; if accurate it is of some value. With few exceptions the accuracy of the authors cannot be called in question; we would, however, protest against the view advanced that, whilst variations in the external organs of ametabolic insects may be due to the influence of environment, the variations of corresponding structures in holometabolic insects are congenital. To use the post-embryonic development of a structure as a criterion whereby to judge the nature of its variation is most unsound, for it is not justified by the results of experiments. So that to state (p. 145), "The variations in the colour pattern of *Diabrotica*, *Hippodamia* and *Vespa* are congenital variations" is, to put it mildly, misleading.

The authors, it is evident, are not supporters of the theory of sexual selection, and all the familiar objections to it are paraded. In this connection it is interesting to read the recently published papers by Mr. Edmund Selous on the courtship of birds; the papers are so admirable that they should be consulted by

everyone interested in the subject, but it is difficult to refrain from quoting the concluding words of the gifted author.

"I would urge that the facts here brought forward by me, in regard to four different species of birds, are, both singly and cumulatively, strongly in support of Darwin's second great hypothesis of sexual selection, and I believe that, as denial from the chair is replaced or supplemented by evidence from the field, the views of that great naturalist and reasoner will be triumphantly and often most strikingly vindicated."

The insects shown in Fig. 251 are not Membracidae or leaf-hoppers of the order Hemiptera, but Acridiidae or grasshoppers of the order Orthoptera. Schaudinn is misspelt Schaudin, and Chillingham Chellenham; there are also one or two obvious misprints. The names of some of the animals quoted are strangely unfamiliar. One might ask the nature of a piddock, a cusk, a silverside, a killifish if the Latin equivalents were not also given, and once again we have occasion to bless the name of Linnæus.

R. S.

STUDIES IN EDUCATION.

The Practice of Instruction. Edited by Prof. J. W. Adamson. Pp. xxi+512. (London: The National Society's Depository, n.d.) Price 4s. 6d. net.

IT has been a favourite plan with English publishers to issue a text-book on teaching made up of separate essays on the teaching of various subjects, with an introduction on general principles of education written by the editor. Mr. P. A. Barnett's "Teaching and Organisation" was the first in the field, and now Prof. Adamson has prepared a similar volume for the National Society.

We confess that we somewhat distrust this method of putting a book together. It is difficult to secure cohesion; some of the essays are pretty certain to disappoint the editor, and such a book can very seldom be adopted for regular use by a body of students. In the volume before us one-third is contributed by the editor, and he provides a really able introduction to the psychology of the schoolroom; there are omissions which betray the author's lack of sympathy with the more practical needs of the young, but within the prescribed limits Prof. Adamson is helpful and clear, and a section devoted to experiments in curriculum and method shows that he is both alive to what is being done at home and abroad, and that he is in sympathy with cautious educational reform.

The rest, two-thirds of the volume, is distributed among ten writers, and some of the essays are of most excellent quality; but Principal Headlam on religious instruction, and Miss Howard on history, are weak performances. Dr. Herbertson's essay on geography contains the views with which, the Geographical Association has made us familiar, but it is very evident that much of the work which he prescribes for children has never been taught by himself, and an air of unreality pervades his proposals. In these three sections we feel sure that the editor would have done better to have worked up